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Evaluation of Early Appendectomy Versus Conservative Management with Interval Appendectomy in Patients with Appendicular Mass

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Abstract **Background:** The current standard of care for patients with appendicitis is the surgical appendectomy, which is the most common surgical emergency in children and young adults with abdominal pain. **Objectives:** This study aimed to compare clinical characteristics and complications of early appendectomy and conservative management with interval appendectomy approaches among patients with appendicular mass. **Patients and methods:** This cross-sectional, prospective, comparative study was conducted on 84 patients with appendicular mass at Rizgary Teaching Hospital from January 2022 to January 2024. Patients were divided into two groups. Group I underwent appendectomy within 24 hours of admission, while group II patients received conventional treatment (intravenous fluids, antibiotics and analgesics) and were discharged once the acute inflammatory mass was resolved and re-admitted for interval appendectomy after 2-3 months. Finally, operative difficulties, total operating time, operative/postoperative complications, total duration of hospital stay and patient compliance were reported and compared in both groups. **Results:** Most clinical characteristics related to appendix (abscessation, intussusception, adhesion, gangrene), nematode infection and hospital resubmission were found less frequently among group I than in another group. Also, group I patients had fewer operation problems during surgery, such as bleeding (14.3%), trauma to the intestine (9.5%) and adhesion difficulties (23.8%), as well as their operation time was significantly ($p \leq 0.05$) shorter than another group (90±15 vs. 105±20 minutes). Moreover, group I patients had significantly fewer health problems after surgery ($p \leq 0.05$), including infected wounds (19%) and residual abscessation at the operation site (9.5%), with shorter hospitalization duration than another group (6.5±2.0 vs. 7.8±2.5 days). **Conclusions:** Early appendectomy of appendicular mass is a safe and effective alternative to conventional conservative treatment, followed by interval appendectomy, due to fewer operation problems and postoperative complications.

Key Words Early appendectomy, Conservative treatment, Interval appendectomy, Appendicular mass

INTRODUCTION

The most frequent cause of abdominal surgery in teenagers is acute appendicitis; therefore, appendectomy is the most commonly performed emergency abdominal operation [1]. Appendicitis is a clinical condition that might be caused by the inflamed vermiform appendix, omentum and intestinal loops that result in swelling and inflammation [2]. Appendicitis diagnosis is usually based on case history, clinical examination and laboratory tests. Generally, less than half (30 to 45%) of patients exhibit atypical signs and symptoms on presentation. Where the diagnosis remains ambiguous, ultrasound and Computed Tomography (CT) scans are the most widely used imaging modalities [2,3].

Depending on preoperative criteria, patients with acute appendicitis need immediate ambulatory surgery due to severe pain and high risk. Whereas patients admitted late in the acute appendicitis course showed complications, such as perforation, abscess formation and developing an inflammatory mass in the right iliac fossa, which increases morbidity and even mortality [4,5]. The lifetime incidence for appendicitis is around 7.0 to 9.0% with insignificant male preponderance (1.4:1). Appendicitis may present at any time and any age but is most prevalent between 10 to 30 years old [6].

The treatment of appendicular mass is controversial; however, several management options exist [7]. Traditionally,

patients were managed conversantly, then followed by interval appendectomy after 4-6 weeks. It is believed that early appendectomy is hazardous and time-consuming and might lead to life-threatening complications, such as faecal fistula [8]. The need for interval appendectomy has also been questioned. The initial conventional approach claims to have a lower complication rate than the early operative approach [9]. Several studies reported that the immediate appendectomy claims to have an early recovery and complete cure during admission. In 10-20% of cases, conservative management fails and the patients need an emergency operation due to peritonitis, which is comparatively more complex and carries more morbidity and mortality. In addition, the patient may suffer recurrent appendicitis after being discharged from the hospital [10].

In rural areas, a large number of patients refuse appendectomy (either laparoscopic or open) once their acute problem is solved and this seems to be a significant disadvantage of the initial conservative approach. Another disadvantage of conservative management is the chance of misdiagnosis of the conditions, including carcinoma of the caecum, neoplasm of the appendix and ileo-ileal intussusceptions [11], especially in step ileocecal tuberculosis, which is very common among the population in our locality. Consequently, the current study aimed to compare patients treated alternatively and then had interval appendectomy to assess the feasibility and safety of immediate appendectomy in the treatment of appendicular mass.

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional, prospective, comparative study was conducted on patients (n = 84) with appendicular mass at the Department of Surgery, Rizgary Teaching Hospital, from January 1st, 2022, to January 1st, 2024.

Inclusion Criteria

Patients aged 16-70 years of either gender presented with appendicular mass (per the operational definition).

Exclusion Criteria

Patients with the American Society of Anesthesiologists (ASA) grades III and IV [12], abdominal malignancy and a previous history of failed medical management within six months for appendicitis were excluded.

Study Protocol

After receiving approval from the hospital's ethical committee to conduct this study, all the patients were clinically examined and evaluated. Then, 5.0 mL of peripheral blood was collected from each patient to perform blood biochemistry. At the same time, other tests, including urinalysis, faecal examination for the internal parasite, whole abdominal ultrasound and plain abdomen X-ray, were also investigated to confirm that they have appendicular mass and to determine the nature of the mass. Later on, patients were divided randomly and equally into two groups (n = 42 each). Group I patients were operated (appendectomy) on within 24 hours of admission under general anaesthesia, while patients in group II were kept on conventional treatment, comprising hospitalization with intravenous fluids, broad-spectrum antibiotics, such as Cefuroxime and Metronidazole together with analgesics. Their mass progress and vital signs were recorded regularly to monitor their response to conventional treatment. They were discharged after complete resolution of the acute inflammatory mass and they were re-admitted after 8-12 weeks for interval appendectomy. The operative difficulties, total operating time, operative/postoperative complications, duration of hospital stay and patient compliance were recorded in both groups, analyzed and then compared.

Ethical Considerations

The study protocol was revised and approved by the Ethical Committee of the College of Medicine, Hawler Medical University, Erbil, Iraq (No. 7/14 on January 12, 2022). All procedures were performed according to the final revision of the Helsinki Declaration [13]. Before starting the work, written informed consent was obtained from the patients for the surgery, research participation and publication of results.

Statistical Analysis

Data analysis was performed using Statistical Package for Social Sciences (SPSS, version 27.0, IBM, Chicago, USA). The categorical data were expressed as numbers and percentages, while non-categorical data were expressed as Mean±standard deviation (SD). The Chi-square test was used to compare between variables. The overall percentage of agreement was calculated and the Kappa value was estimated. A p-value of <0.05 was considered a significant difference.

RESULTS

Group I patients who underwent appendectomy within 24 hours of admission had less simple mass (35.7%), loculated pus collection (19.0%), appendicular abscess (11.9%), adhesions (28.6%), *Enterobius vermicularis* infection (7.1%), intussusception (4.8%), hospital readmission rate (9.5%) and gangrenous appendix (14.3%) than group II who underwent conservative management and interval appendectomy. However, more perforated appendix cases were found among group I patients (Table 1).

Similarly, group I patients had fewer operation problems during surgery, including bleeding (14.3%), mild trauma to the intestine (9.5%) and adhesion difficulties (23.8%), as well as their operation time was significantly ($p \leq 0.05$) shorter than group II (90±15 vs. 105±20 minutes) (Table 2).

Additionally, group I patients had significantly fewer health problems after the surgical operation ($p \leq 0.05$), including infected wounds (19%) and residual abscessation at the operation site (9.5%), together with shorter hospitalization duration than group II (6.5±2.0 vs. 7.8±2.5 days) (Table 3).

Table 1: Distribution of clinical characteristics among studied patients

Variable	Group 1 (n = 42)	Group 2 (n = 42)	p-value
	Number (Percentage)		
Simple Mass	15 (35.7)	20 (47.6)	0.043*
Perforated Appendix	10 (23.8)	7.0 (16.7)	0.055
Loculated Pus Collection	8.0 (19.0)	12 (28.6)	0.045*
Appendicular Abscess	5.0 (11.9)	9.0 (21.4)	0.039*
Adhesions	12 (28.6)	14 (33.3)	0.065
Enterobius vermicularis	3.0 (7.1)	5.0 (11.9)	0.057
Intussusception	2.0 (4.8)	3.0 (7.1)	0.061
Readmission to Hospital	4.0 (9.5)	6.0 (14.3)	0.059
Gangrenous Appendix	6.0 (14.3)	8.0 (19.0)	0.063

*Significant difference using the Chi-square test

Table 2: The operation variables among operated patients

Variable	Group 1 (n = 42)	Group 2 (n = 42)	p-value
	Number (Percentage)		
Bleeding	6.0 (14.3)	8.0 (19.0)	0.063
Mild Trauma to the Bowel	4.0 (9.5)	5.0 (11.9)	0.058
Difficulty with Adhesions	10 (23.8)	12 (28.6)	0.064
Time of Operation (Minutes) (Mean±SD)	90±15	105±20	0.044*

*Significant difference using the Chi-square test

Table 3: The problems observed after surgical operation among operated patients

Variable	Group 1 (n = 42)	Group 2 (n = 42)	p-value
	Number (Percentage)		
Wound Infection	8.0 (19.0)	12 (28.6)	0.045*
Residual Abscess	4.0 (9.5)	7.0 (16.7)	0.049*
Hospital Stay (Days) (Mean±SD)	6.5±2.0	7.8±2.5	0.075

*Significant difference using the Chi-square test

DISCUSSION

Conventional treatment is a conservative regime popularized as the standard treatment for appendicular mass. Failure of the conservative regime occurs in 2-4% of cases. Thus, most studies focused on finding an alternative approach to replace the conventional one with a safer, more effective method to reduce the patient's pain, complications, hospitalization, morbidity and mortality [14].

Generally, it was indicated that the main cause of appendicular mass formation is delayed patient presentation [15]. Thus, in this study, we used two various approaches to find a better method for treating patients with appendicular mass more successfully, with reduced side effects and complications, high patient satisfaction and more compliance.

Accordingly, in the current study, those patients with appendicular mass who underwent appendectomy immediately after 24 hours of admission had less simple mass, loculated pus collection, appendicular abscess, adhesions, internal worm infection, intussusception, hospital readmission rate and gangrenous appendix than another who underwent conservative management and interval appendectomy. In contrast, the perforated appendix was observed more frequently among patients of the early appendectomy group. Also, in the present study, early appendectomy in patients results in fewer operation issues at the time of surgery, such as bleeding, mild trauma to the intestine and adhesion difficulties. Also, its operation time was significantly ($p \leq 0.05$) shorter than the conservative management group. Consequently, patients with immediate appendectomy had substantially fewer postoperative complications ($p \leq 0.05$), such as infected wounds and residual abscessation at the surgical area, with shorter hospital stays than another group who experienced conservative management, followed by interval appendectomy.

In this regard, several studies were performed and obtained comparable outcomes to this study, such as Agarwal and Agarwal, 2017, who found fewer postoperative complications, early discharges, less economic burden of treatment and early return to work among patients with early appendicular mass exploration [15]. Similarly, Patel and Patel [14] reported early exploration as a safe method that confirms the diagnosis more accurately, removes the need for readmission, is curative, time-saving, reduces the cost of management and shortens hospital stays with early return to work. Moreover, Kumar *et al.* [16] mentioned that operative problems, such as localization of the appendix, adhesions and bleeding, are more pronounced and troublesome with interval appendectomy, while wound infection remained a common postoperative complication of early appendectomy. Furthermore, Das *et al.* [1] stated that early appendectomy in appendicular mass is safe using improved surgical techniques and better postoperative care. Also, Tarar *et al.* [17] found that conservative management of patients with appendicular mass was associated with prolonged hospital stays. Yet, it was found equally safe regarding the frequency of appendicular perforation, which advocates conservative management of appendicular mass, particularly in high-risk patients.

Controversially, Elsaady [18] stated that the conservative approach is still an exceptionally effective and safe method of appendicular mass treatment, with no significant operative difficulties in the failed group. The rate of recurrence after successful conservative management was low to justify interval appendectomy as a routine approach. Also, they confirmed that the laparoscopic approach seems promising, with early recovery and diagnostic superiority for a hidden pathology. Similarly, Demetrashvili *et al.* [8] reported that conservative treatment without interval surgery seems to be the preferred method for treatment of appendicular mass and abscess. Collectively, the appendicular mass may be treated conservatively without delayed appendectomy and patients can undergo surgical intervention only in case of recurrence of appendicitis when the patient's condition is not improving. Thus, CT and colonoscopy within 4 to 6 weeks after completing the conservative treatment is recommended in diagnosed/discharged patients [19]. However, conservative treatment is associated with a risk of missing or delaying hidden pathologies, such as malignant disease and Crohn's disease [20]. These similarities between different studies might be related to the nature of the study, sample size, case severity, hospital facilities, surgeons' experience, patients' presentations and patients' follow-up.

The strengths of this study are the randomization of the study sample and the post-stratification comparison of groups to address effect modifiers. However, the study's limitations are that it is a single-center study with a small sample size. Thus, more extensive multicenter studies are needed to clarify the optimal treatment approach.

CONCLUSIONS

Early appendectomy on the appendicular mass approach reduces mortality, morbidity and hospital readmission for surgery, mainly when caused by appendicitis, vermicularis, gangrene, fecoliths and intussusception. Thus, this method reduced patients' hospital stay and early return to work, making it safer and effectively better than conservation treatment due to its fewer operation problems and post-surgical complications.

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Conflicts of Interest

The author has no conflicts of interest to be presented.

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